Water@OneUSF

Mark Rains, Shawn Landry, James Mihelcic, Charles Jacoby
University of South Florida

OVerFlow Seminar Series
April 15, 2025

USF UNIVERSITY OF SOUTH FLORIDA

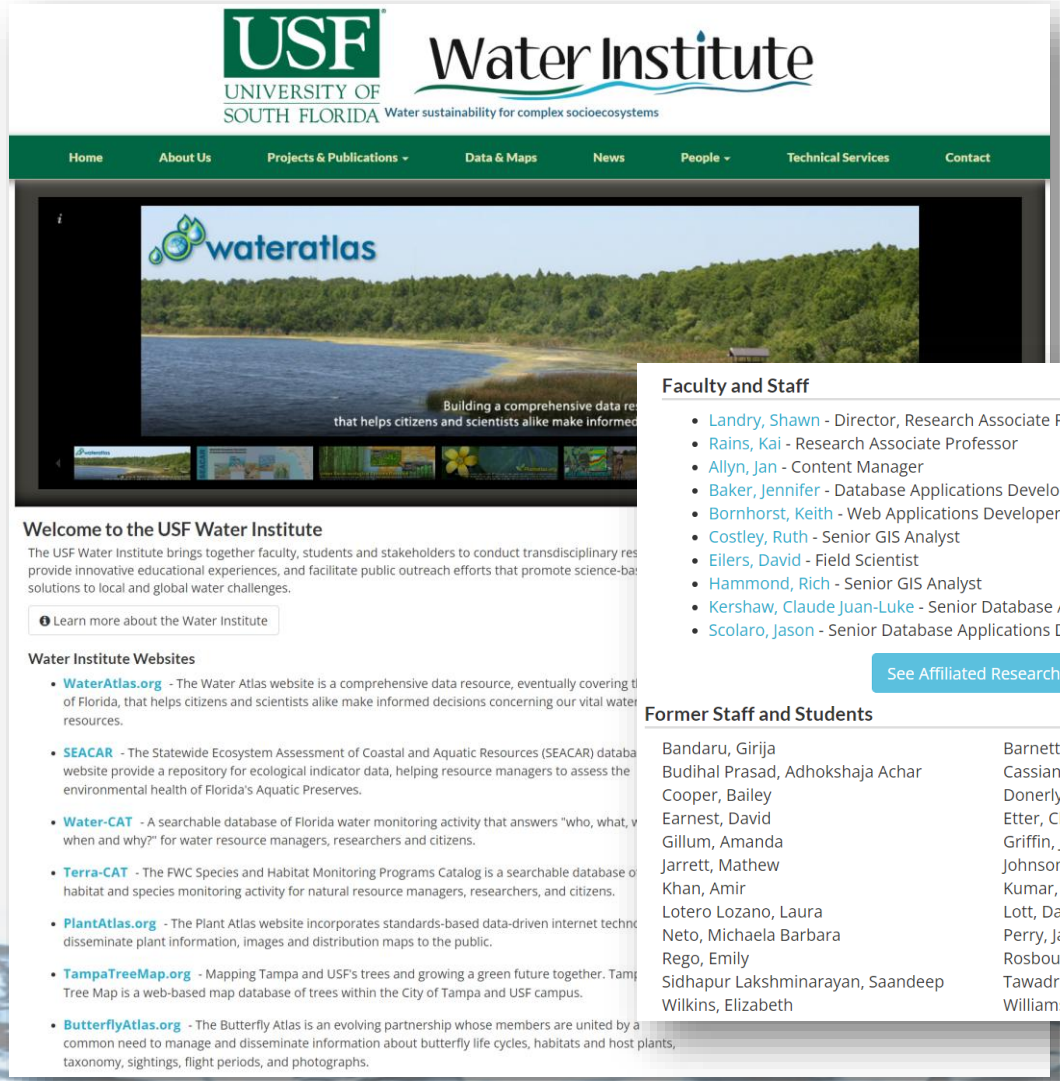
PRESENTATION OUTLINE

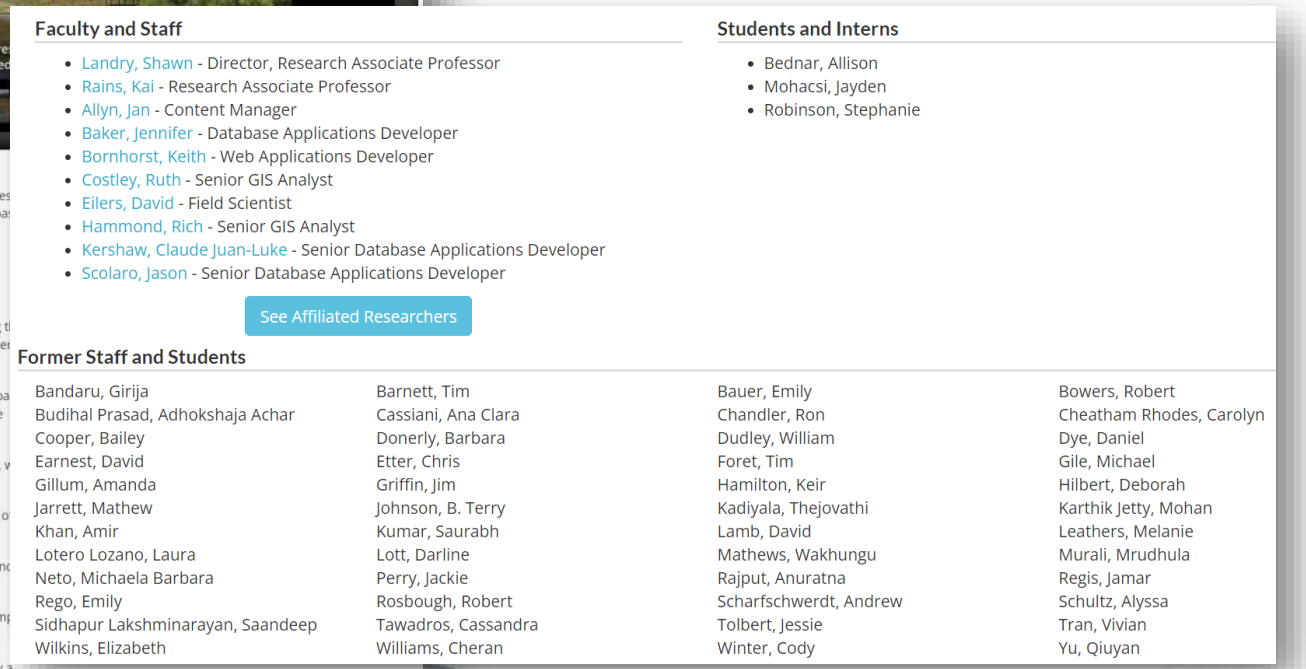
- Mark Rains – Introductory Remarks
- USF Water Center – Shawn Landry
- USF College of Engineering – James Mihelcic
- USF College of Marine Science – Charles Jacoby
- Wrap up – Mark Rains

LIKE MANY OF YOU, WE'RE SCATTERED….

- 3 (Possibly 2) Campuses
- 5 (Or More) Colleges
  - College of Arts and Sciences
  - College of Engineering
  - College of Marine Science
  - Patel College of Global Sustainability
  - College of Public Health
  - College of the Environment?

USF Water Institute





Water Institute
School of Geosciences · College of Arts & Sciences

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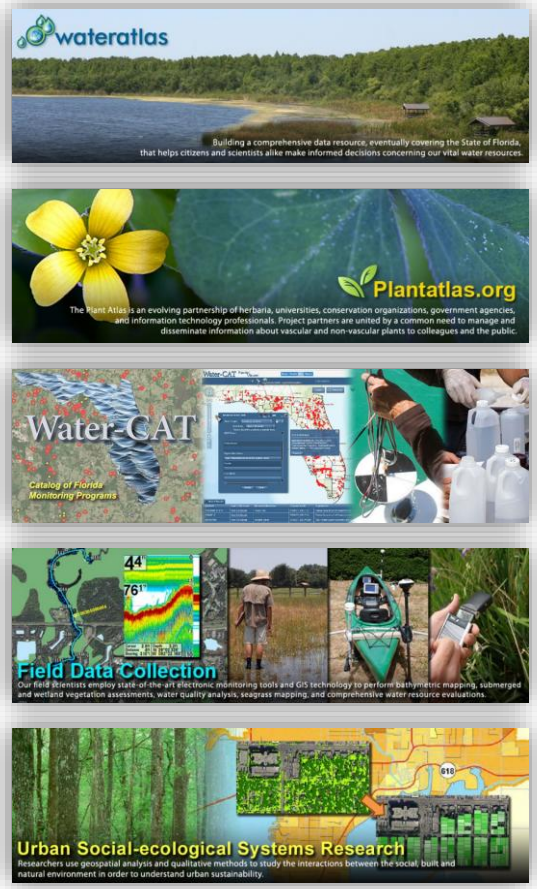
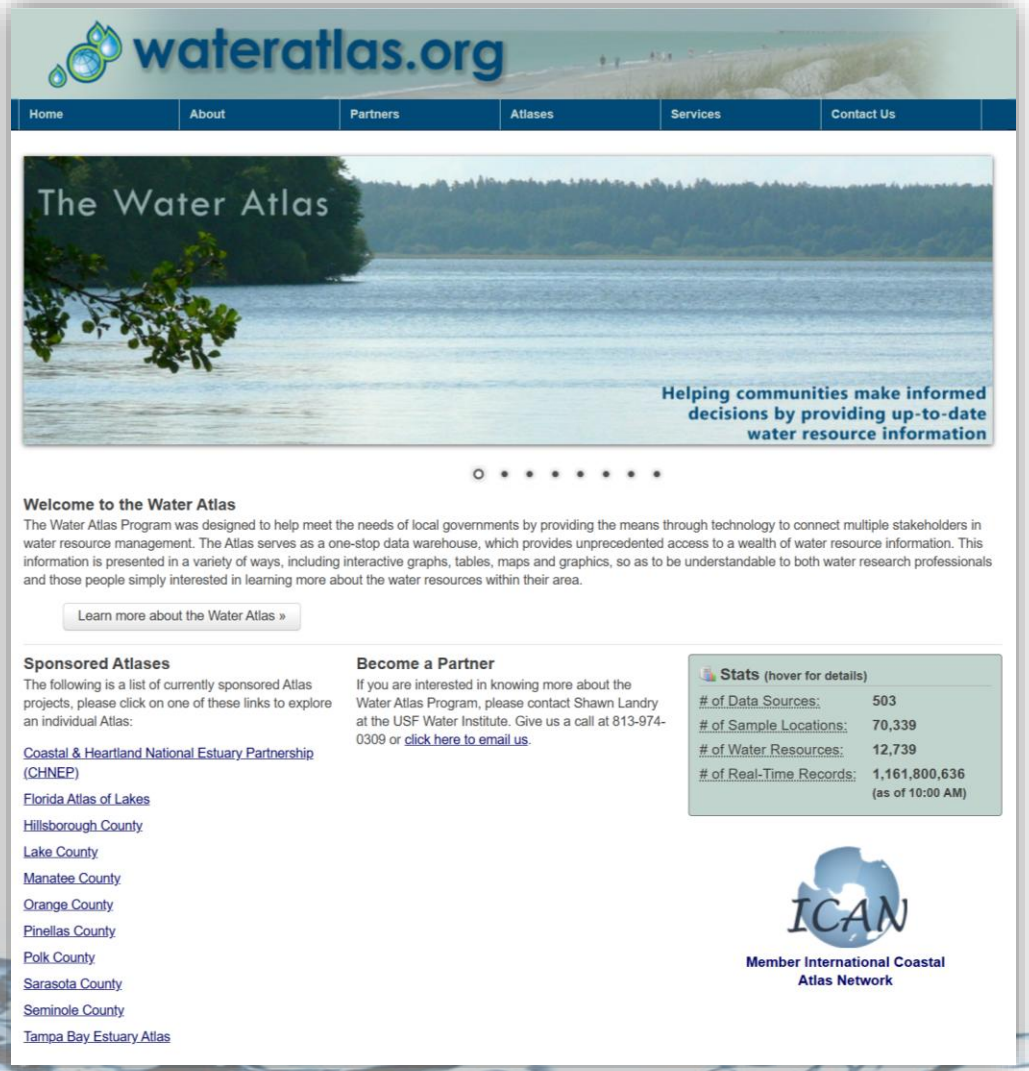
Overview of Projects

- Decision Support and Public Education
  - Water Atlas
  - SEACAR
  - Plant Atlas
  - Water-CAT
- Technical Services
  - Lake, Pond and Stream Assessments
  - Infrastructure Mapping and Technical Services
- Research
  - Urban Social-Ecological Systems Research
  - Urban Forest management and policy
  - Water and Wetland Studies

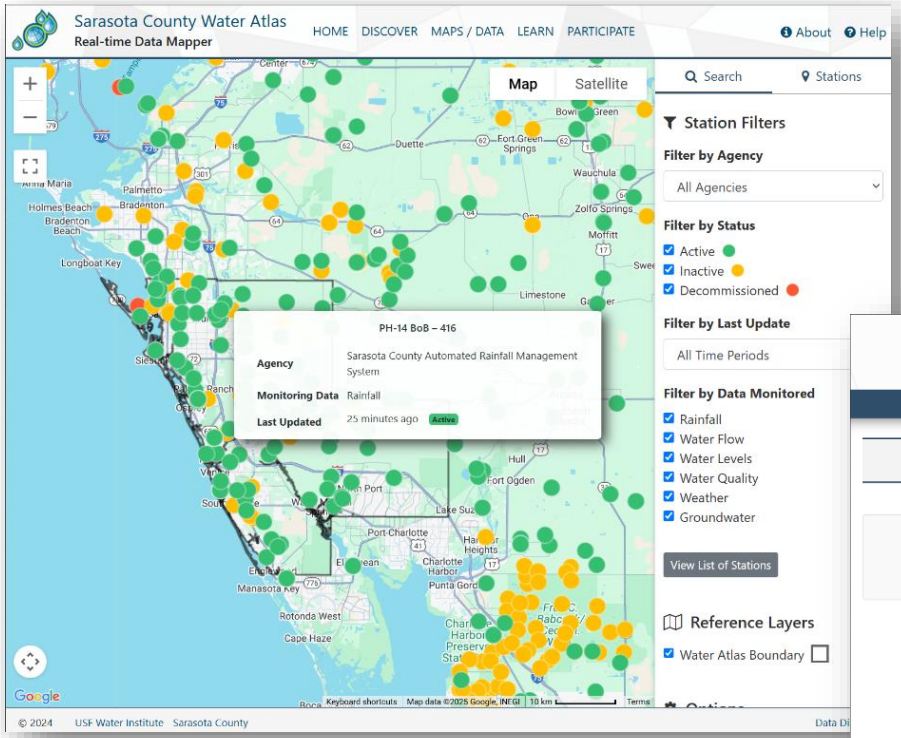


WaterAtlas.org



- Started in 1998
- Funded by local governments
- Supports surface water management requirements of Clean Water Act
- Used by water management professionals, researchers/students, and the public

WaterAtlas.org Data



- 504 data providers
- 12,739 water resources
- 72,961 sample locations
- @ 1.2 billion data samples

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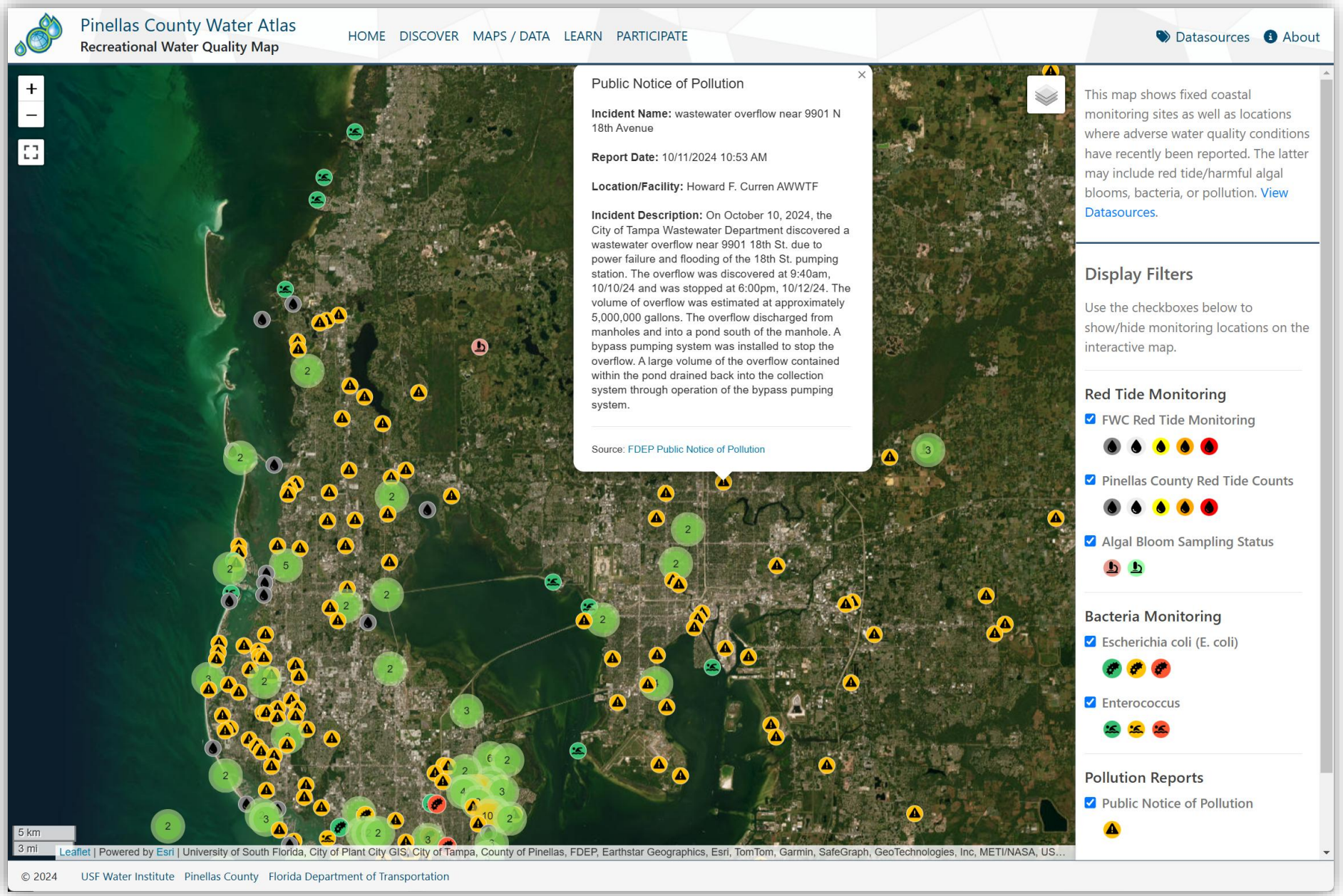
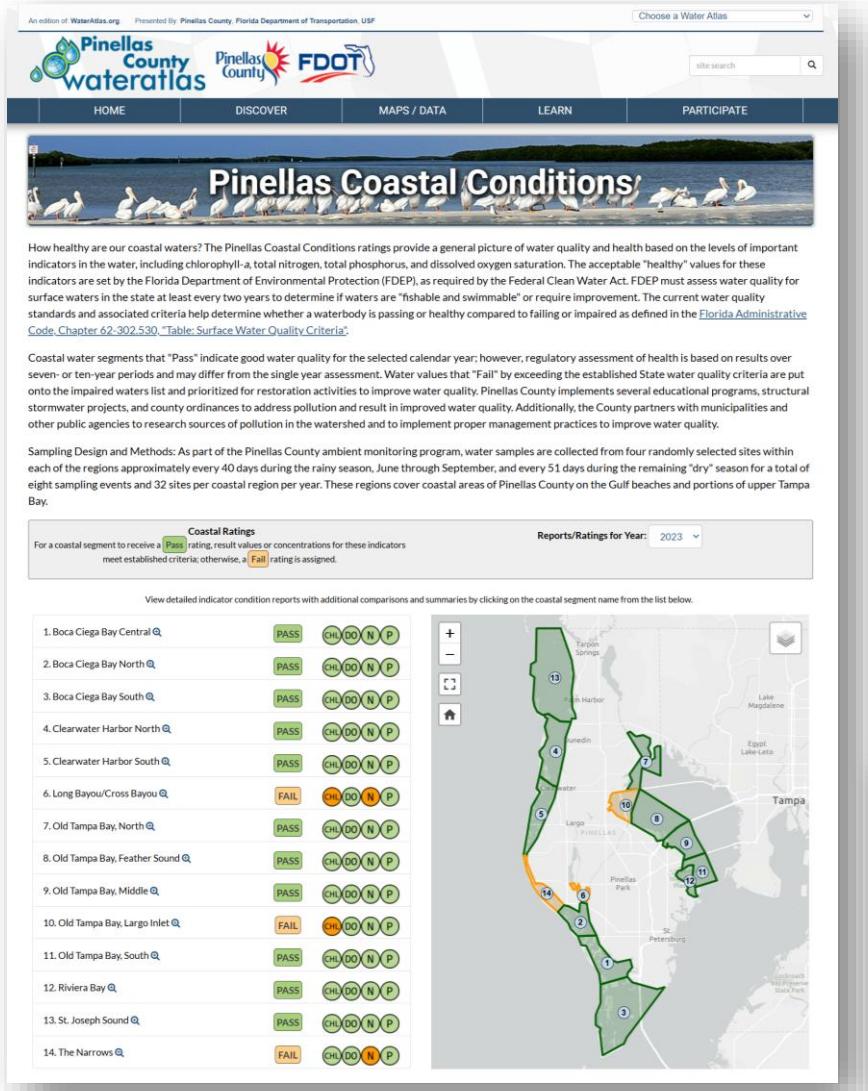
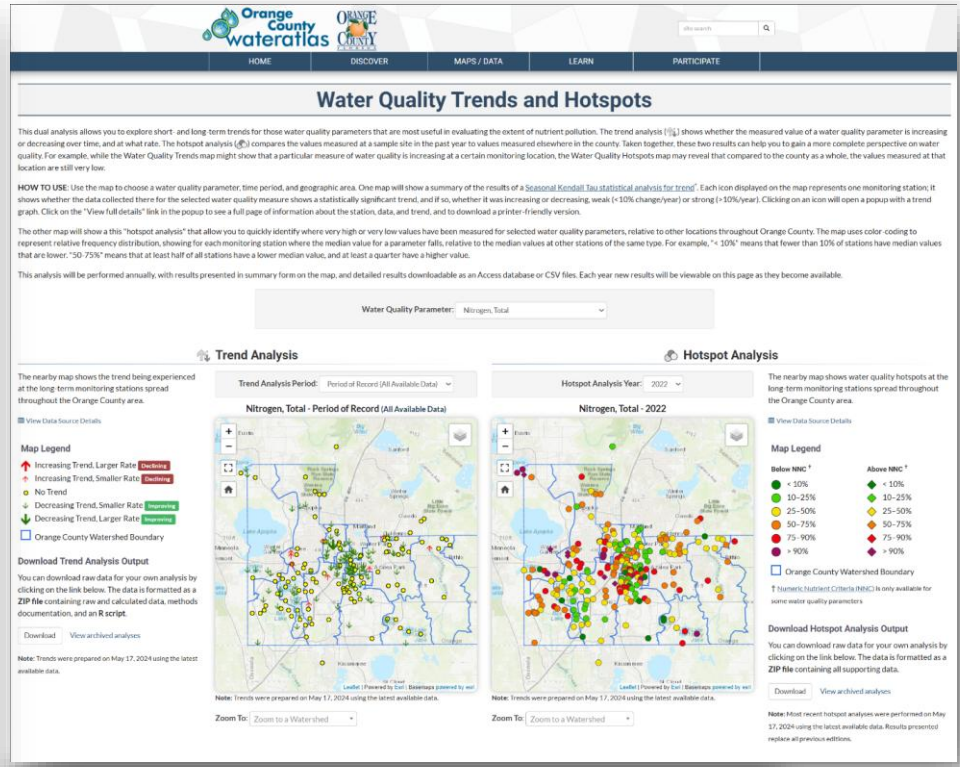
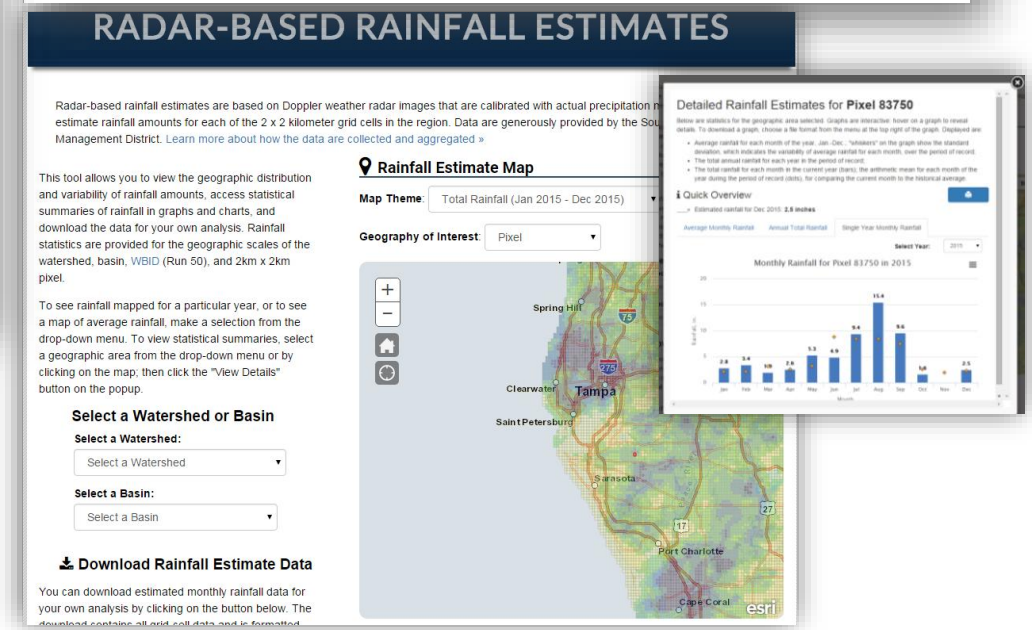
Consolidation of Public Health Alerts

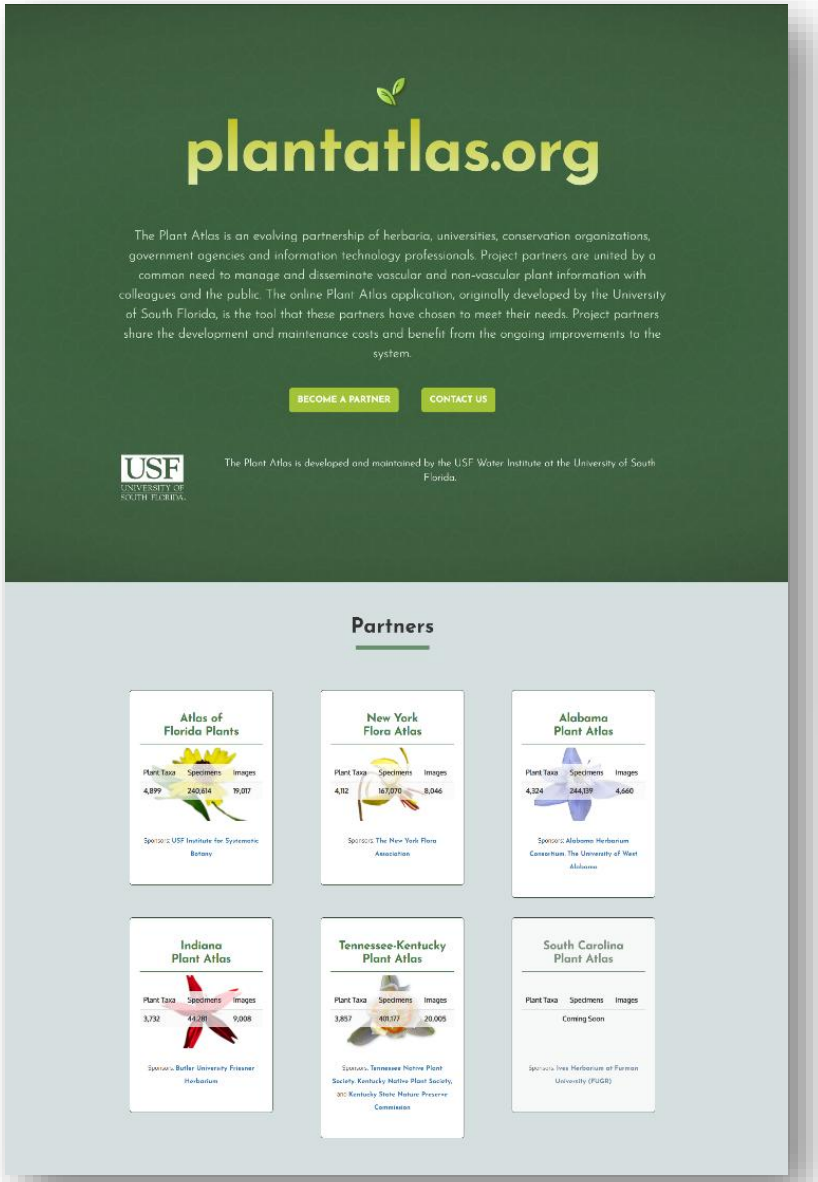


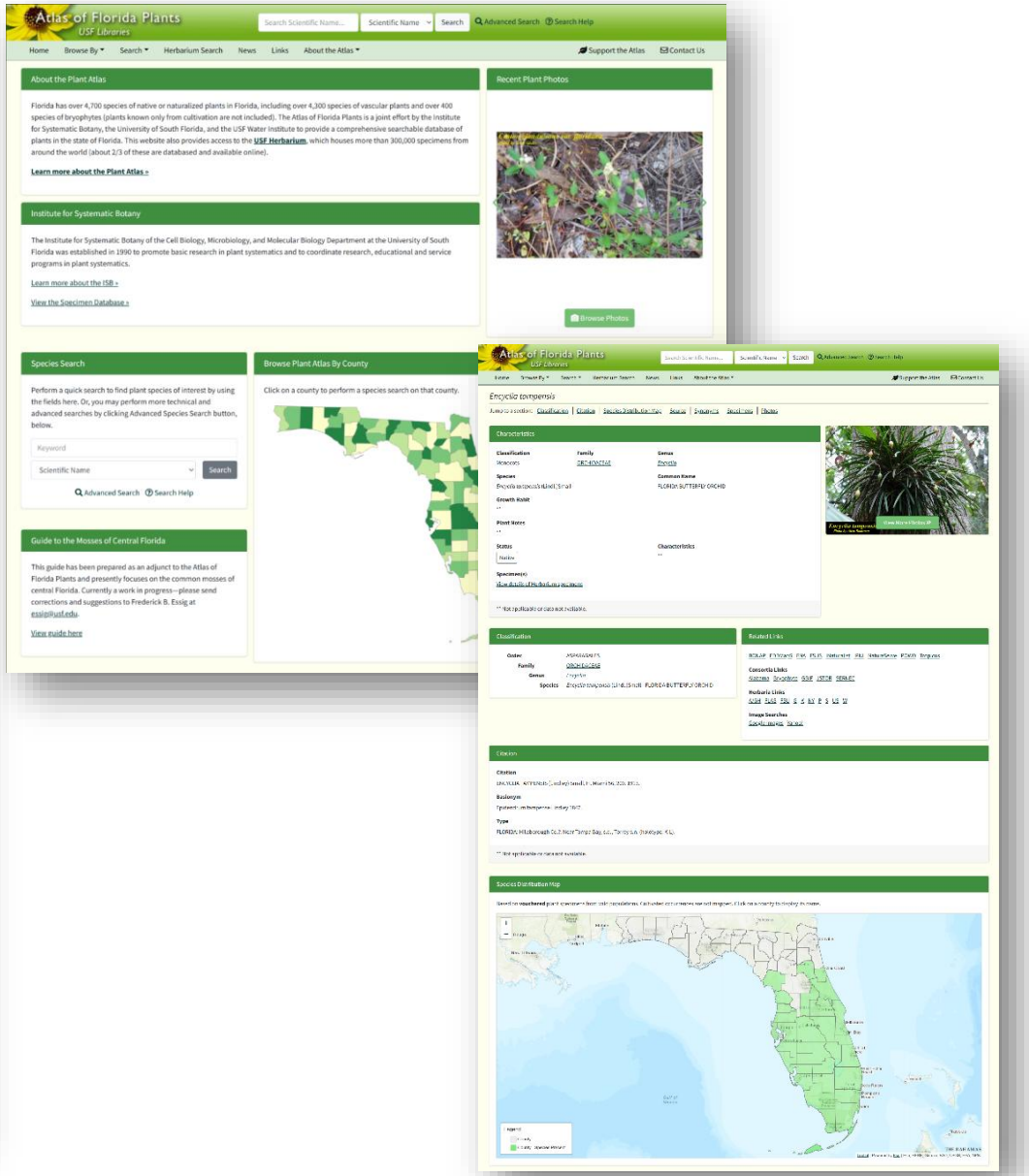

Pinellas Coastal Conditions
HOME
DISCOVER
MAPS / DATA
LEARN
PARTICIPATE
How healthy are our coastal waters? The Pinellas Coastal Conditions ratings provide a general picture of water quality and health based on the levels of important indicators in the water, including chlorophyll-a, total nitrogen, total phosphorus, and dissolved oxygen saturation. The acceptable "healthy" values for these indicators are set by the Florida Department of Environmental Protection (FDEP), as required by the Federal Clean Water Act. FDEP must assess water quality for surface waters in the state at least every two years to determine if waters are "fishable and swimmable" or require improvement. The current water quality standards and associated criteria help determine whether a waterbody is passing or healthy compared to failing or impaired as defined in the Florida Administrative Code, Chapter 62-302.530, "Table: Surface Water Quality Criteria".
Coastal water segments that "Pass" indicate good water quality for the selected calendar year; however, regulatory assessment of health is based on results over seven- or ten-year periods and may differ from the single year assessment. Water values that "Fail" by exceeding the established State water quality criteria are put onto the impaired waters list and prioritized for restoration activities to improve water quality. Pinellas County implements several educational programs, structural stormwater projects, and county ordinances to address pollution and result in improved water quality. Additionally, the County partners with municipalities and other public agencies to research sources of pollution in the watershed and to implement proper management practices to improve water quality.
Sampling Design and Methods: As part of the Pinellas County ambient monitoring program, water samples are collected from four randomly selected sites within each of the regions approximately every 40 days during the rainy season, June through September, and every 51 days during the remaining "dry" season for a total of eight sampling events and 32 sites per coastal region per year. These regions cover coastal areas of Pinellas County on the Gulf beaches and portions of upper Tampa Bay.
Coastal Ratings
For a coastal segment to receive a Pass rating, result values or concentrations for these indicators meet established criteria; otherwise, a Fail rating is assigned.
Reports/Ratings for Year: 2023
View detailed indicator condition reports with additional comparisons and summaries by clicking on the coastal segment name from the list below.
1. Boca Ciega Bay Central PASS
2. Boca Ciega Bay North PASS
3. Boca Ciega Bay South PASS
4. Clearwater Harbor North PASS
5. Clearwater Harbor South PASS
6. Long Bayou/Cross Bayou FAIL
7. Old Tampa Bay, North PASS
8. Old Tampa Bay, Feather Sound PASS
9. Old Tampa Bay, Middle PASS
10. Old Tampa Bay, Largo Inlet FAIL
11. Old Tampa Bay, South PASS
12. Riviera Bay PASS
13. St. Joseph Sound PASS
14. The Narrows FAIL
Tampa
St. Petersburg


Water Quality Trends and Hotspots
HOME
DISCOVER
MAPS / DATA
LEARN
PARTICIPATE
Water Quality Parameter: Nitrogen, Total
Trend Analysis
Hotspot Analysis
Trend Analysis Period: Period of Record (All Available Data)
Hotspot Analysis Year: 2022
Nitrogen, Total - Period of Record (All Available Data)
Nitrogen, Total - 2022
Map Legend
Increasing Trend, Larger Rate
Increasing Trend, Smaller Rate
No Trend
Decreasing Trend, Smaller Rate
Decreasing Trend, Larger Rate
Orange County Watershed Boundary
Download Trend Analysis Output
Download Hotspot Analysis Output
Zoom To: Zoom to a Watershed

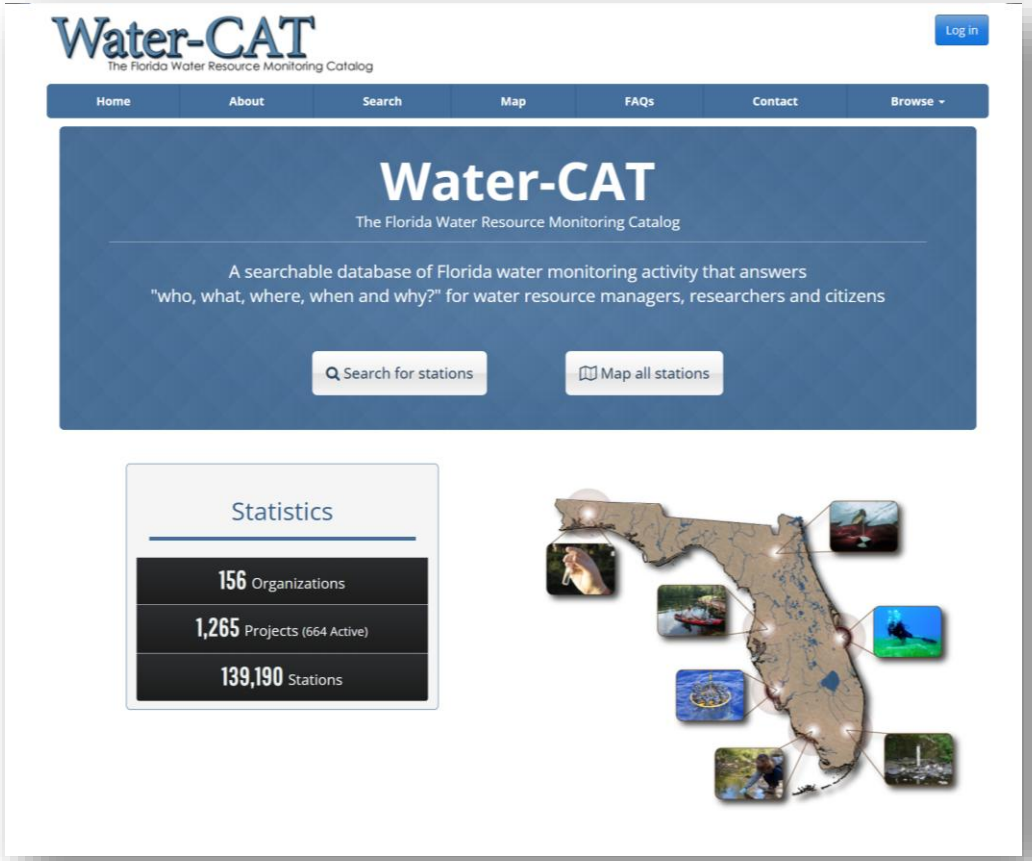

RADAR-BASED RAINFALL ESTIMATES
Radar-based rainfall estimates are based on Doppler weather radar images that are calibrated with actual precipitation
estimate rainfall amounts for each of the 2 x 2 kilometer grid cells in the region. Data are generously provided by the Sou
Management District. Learn more about how the data are collected and aggregated »
This tool allows you to view the geographic distribution and variability of rainfall amounts, access statistical summaries of rainfall in graphs and charts, and download the data for your own analysis. Rainfall statistics are provided for the geographic scales of the watershed, basin, WBID (Run 50), and 2km x 2km pixel.
To see rainfall mapped for a particular year, or to see a map of average rainfall, make a selection from the drop-down menu. To view statistical summaries, select a geographic area from the drop-down menu or by clicking on the map; then click the "View Details" button on the popup.
Rainfall Estimate Map
Map Theme: Total Rainfall (Jan 2015 - Dec 2015)
Geography of Interest: Pixel
Select a Watershed or Basin
Select a Watershed:
Select a Watershed
Select a Basin:
Select a Basin
Download Rainfall Estimate Data
You can download estimated monthly rainfall data for your own analysis by clicking on the button below. The
Spring Hill
Clearwater
Tampa
Saint Petersburg
Sarasota
Port Charlotte
Cape Coral
esri
Detailed Rainfall Estimates for Pixel 83750
Quick Overview
Monthly Rainfall for Pixel 83750 in 2015

PlantAtlas.org



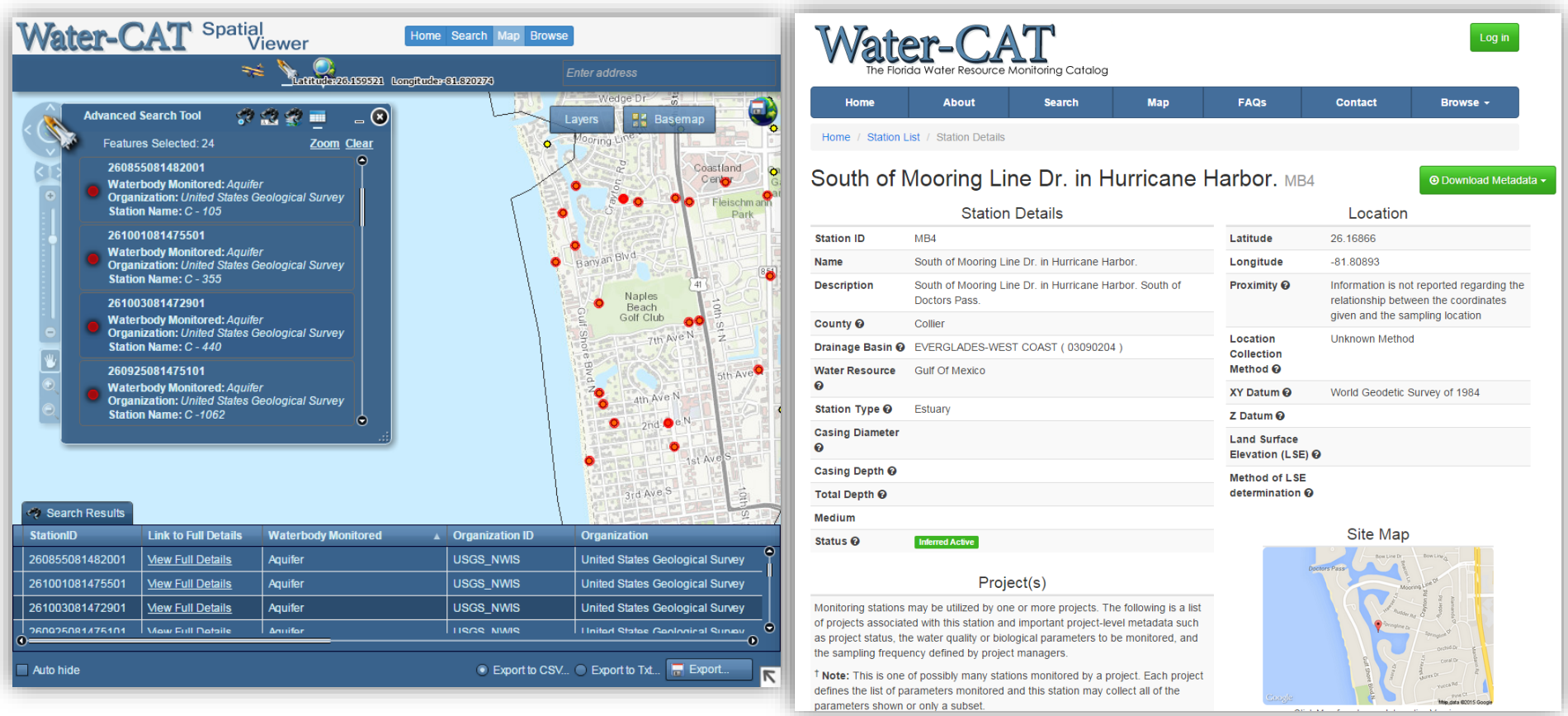


Florida Water Resource Monitoring Catalog: water-cat.org



- Conceived by the Florida Water Resource Monitoring Council
- Goal is to *improve knowledge of monitoring activities*
  - Online catalog of all water-resources monitoring activities
- Long-term support from FDEP

Who, Where, What and Why of Environmental Monitoring



156 organizations (so far) 1,265 monitoring projects 139,190 monitoring stations

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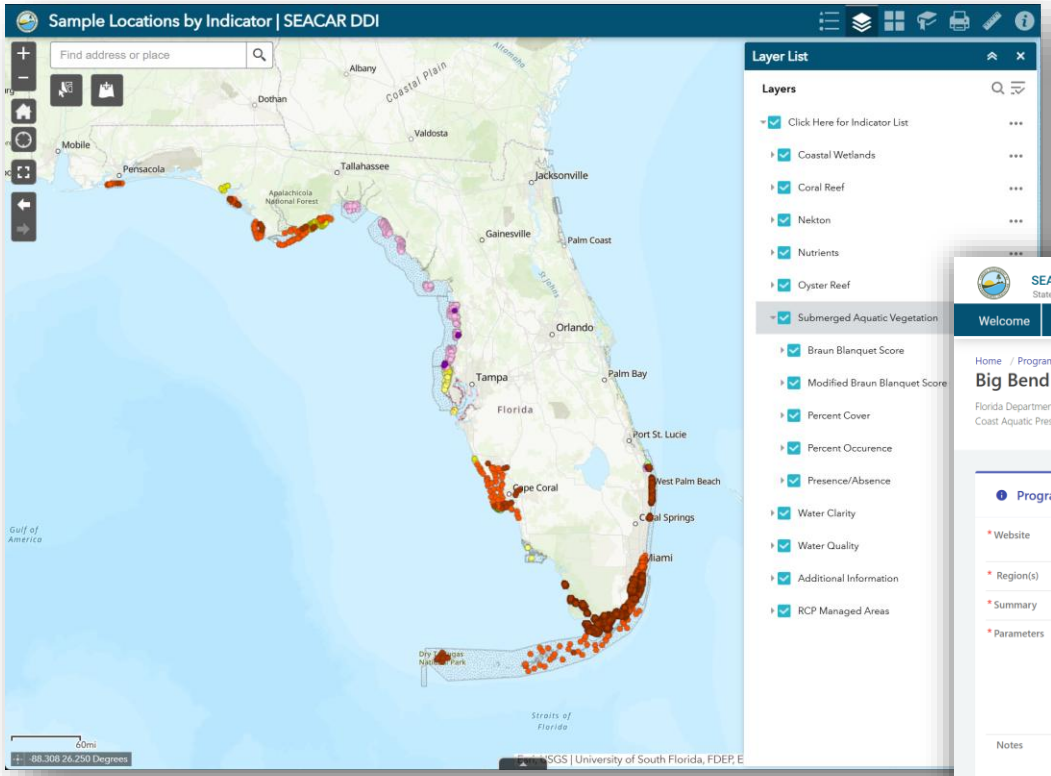
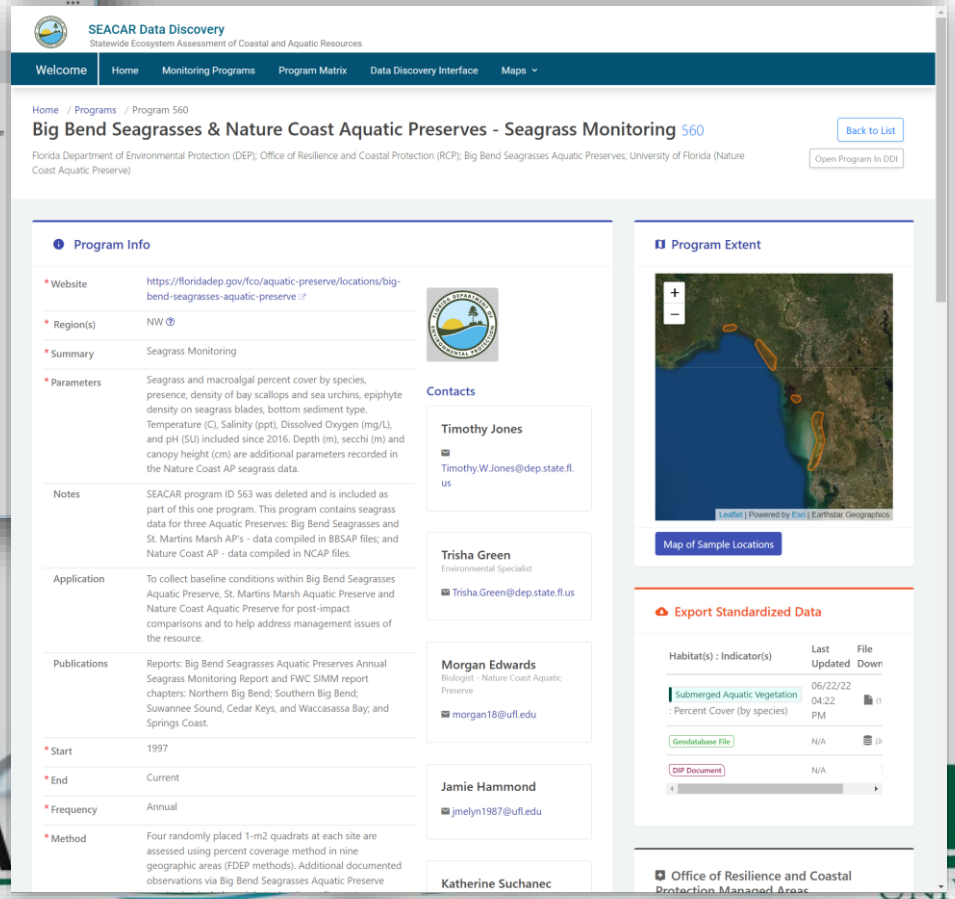
Statewide Ecosystem Assessment of Coastal and Aquatic Resources (SEACAR)





https://data.florida-seacar.org/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College of Engineering

≈ ten years ago we received an EPA Grant to establish the Center for Reinventing Aging Infrastructure for Nutrient Management –

James Mihelcic - Director

- develop science behind new technology
- demonstrate new technological innovations originating from the new science to provide knowledge for community members, policy makers, regulators, design engineers, and regulated entities.
- Integrate our innovations with sustainability assessments and systems-based approaches applicable to the management of point and diffuse sources of nutrients, over different scales

reclaim
water • nutrients • energy

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Long-term demonstration of stormwater bioretention system to remove nitrogen in under-served community (Drs. Sarina Ergas & James Mihelcic)

Without Plants

With Plants

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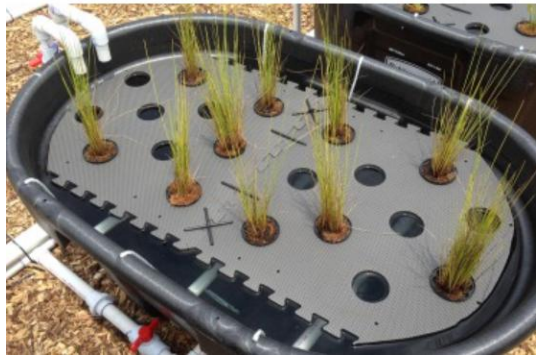
A PREEMINENT RESEARCH UNIVERSITY

Dr. Sarina Ergas, Dr. Mahmood Nachabe

Evaluation of Floating Treatment Wetlands (FTW) with Biochar and Different Macrophytes for Nutrient Removal from Urban Stormwater Runoff

Setting up of FTW systems at Aaran's pond



Mesocosm study (from Spangler et al., 2019)

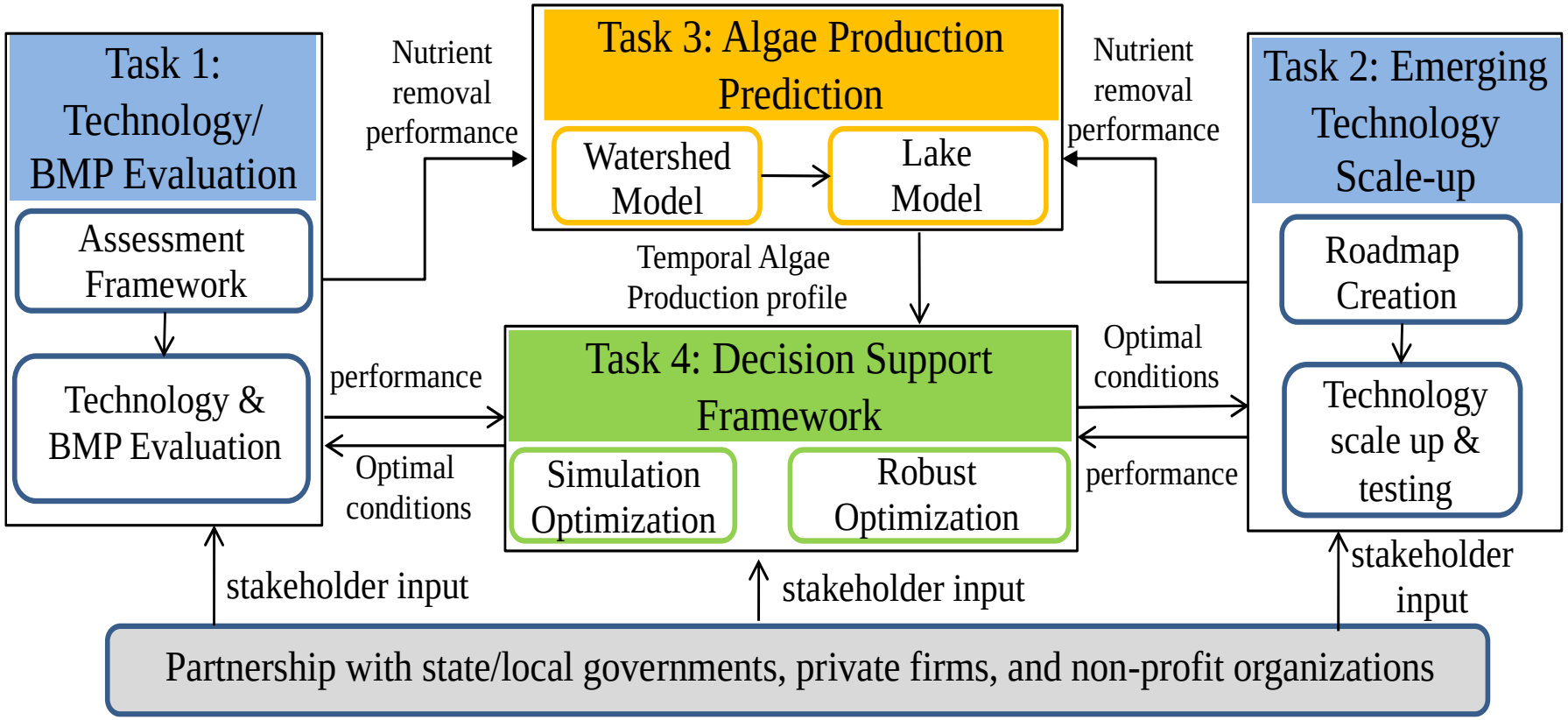
Treatment	Plants	Media
1	None	Coir + biochar
2	None	Coir
3	Golden canna	Coir + biochar
4	Golden canna	Coir
5	Fakahatchee grass	Coir + biochar
6	Canna + Fakahatchee	Coir + biochar

FTW experimental program for mesocosm study (closed tank setup)

- What key factors and processes affect nutrient removal in FTWs?
- Does biochar improve FTW nutrient removal and microbial diversity?
- How does plant species affect performance?
- How do nutrient loading rates and hydraulic retention times affect performance?

Temporal and Spatial Optimization of Existing and Emerging Nutrient Management Technologies and Practices for Control of Harmful Algal Blooms

- **Team:** Zhang, Q. (PI), Arias, M., Charkhgard, H., Ergas, S., Mihelcic, J., Nachabe, M., Rains, M. (Co-PIs)
- **Goal:** Optimize the implementation of nutrient treatment technologies and management practices
  - What, where and when?



Integrating Modeling Tools & Observations in the Caloosahatchee, Lake Okeechobee, and St. Lucie Estuary for Prediction & Management of Harmful Algal Blooms (CLOSE-HABs)

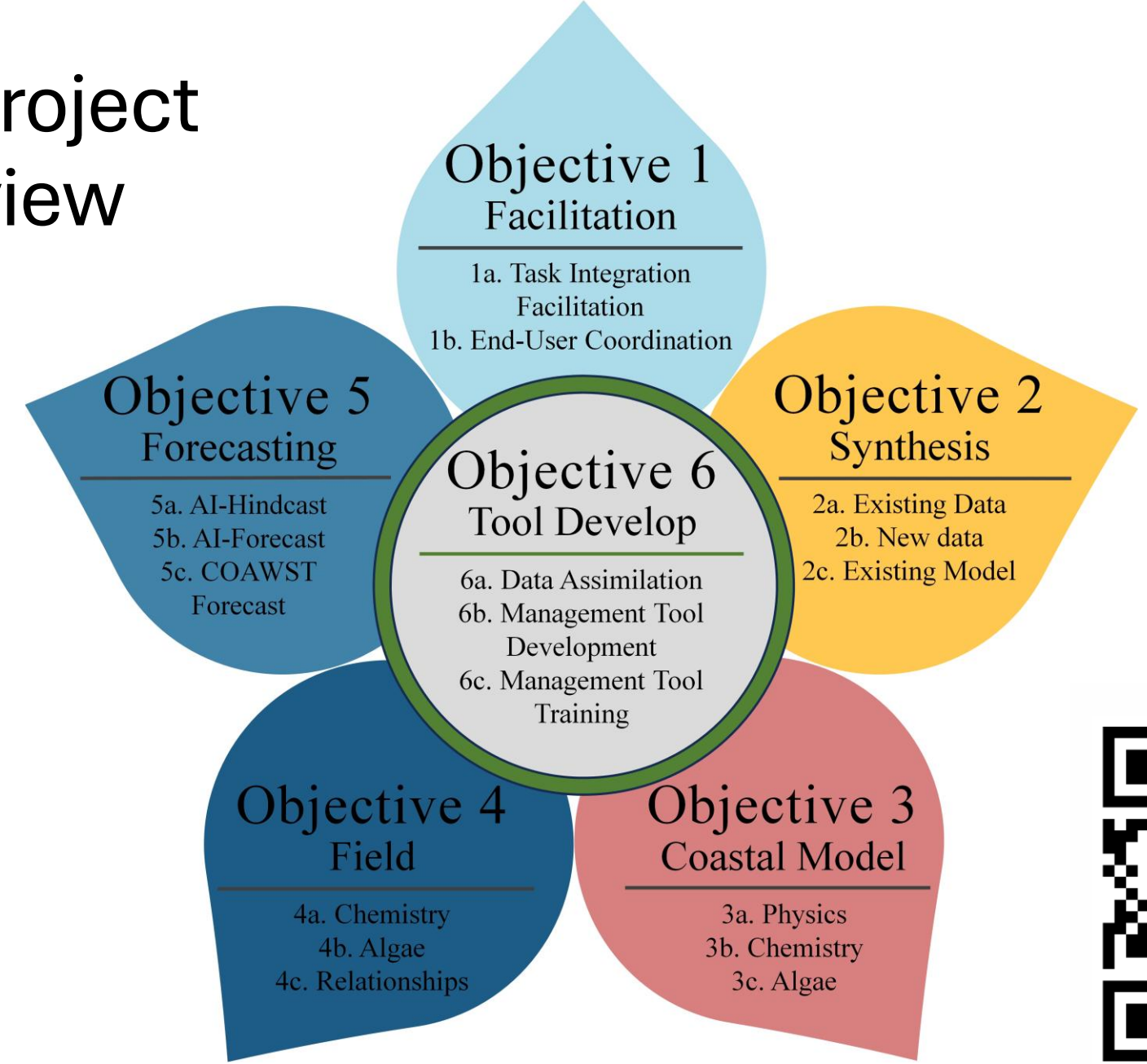
PI: Mauricio Arias

USF Co-PI: Qiong Zhang

Non-USF Investigators: David Kaplan, Maitaine Olabarrieta, Ed Phlips, Elise Morrison, Cassondra Armstrong

sfwmd.gov

SLEW Project Overview



https://www.usf.edu/engineering/cee/research/algal-bloom-research/index.aspx

Blue Green Action Platform

Bridging Communities Upstream and Downstream for Nitrogen Management: An inclusive, people-centered platform and capacity-building initiative

Dr. Maya Trotz

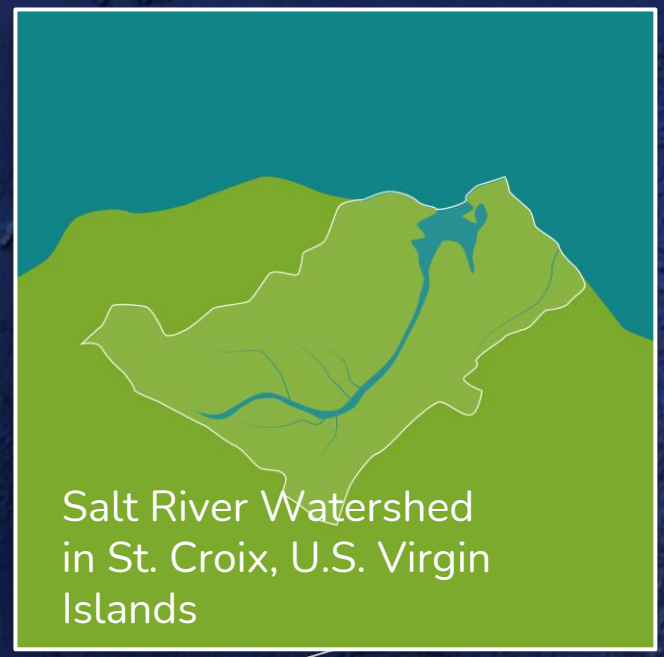
BlueGAP

BlueGAP humanizes nitrogen pollution by providing stories, trusted data, consultation, and resources to benefit those most impacted by nitrogen pollution.

Mississippi River Watershed

Stories + Data = Action

Tampa Bay Watershed



Salt River Watershed in St. Croix, U.S. Virgin Islands

Resilient Florida Program

PLANNING GRANTS	STATEWIDE FLOODING AND SEA LEVEL RISE RESILIENCE PLAN	STATEWIDE DATA SET AND ASSESSMENT	REGIONAL RESILIENCE ENTITIES
To assist local governments with Vulnerability Assessments, Peril of Flood Comprehensive Plan Amendments	To assist local governments and eligible entities in implementing projects that address flooding and sea level rise	Collection of local vulnerability assessments and data to assist in creating a Statewide Flooding and Sea Level Rise Assessment	Technical Support, develop project applications for members and multijurisdictional collaboration

Up-to-date, realistic, and consistent
standards and projections of compound flooding

FLORIDA FloodHub
FOR APPLIED RESEARCH AND INNOVATION

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Workgroups

Sea Level Change Workgroup

Rainfall Workgroup

Comprehensive Modeling Workgroup

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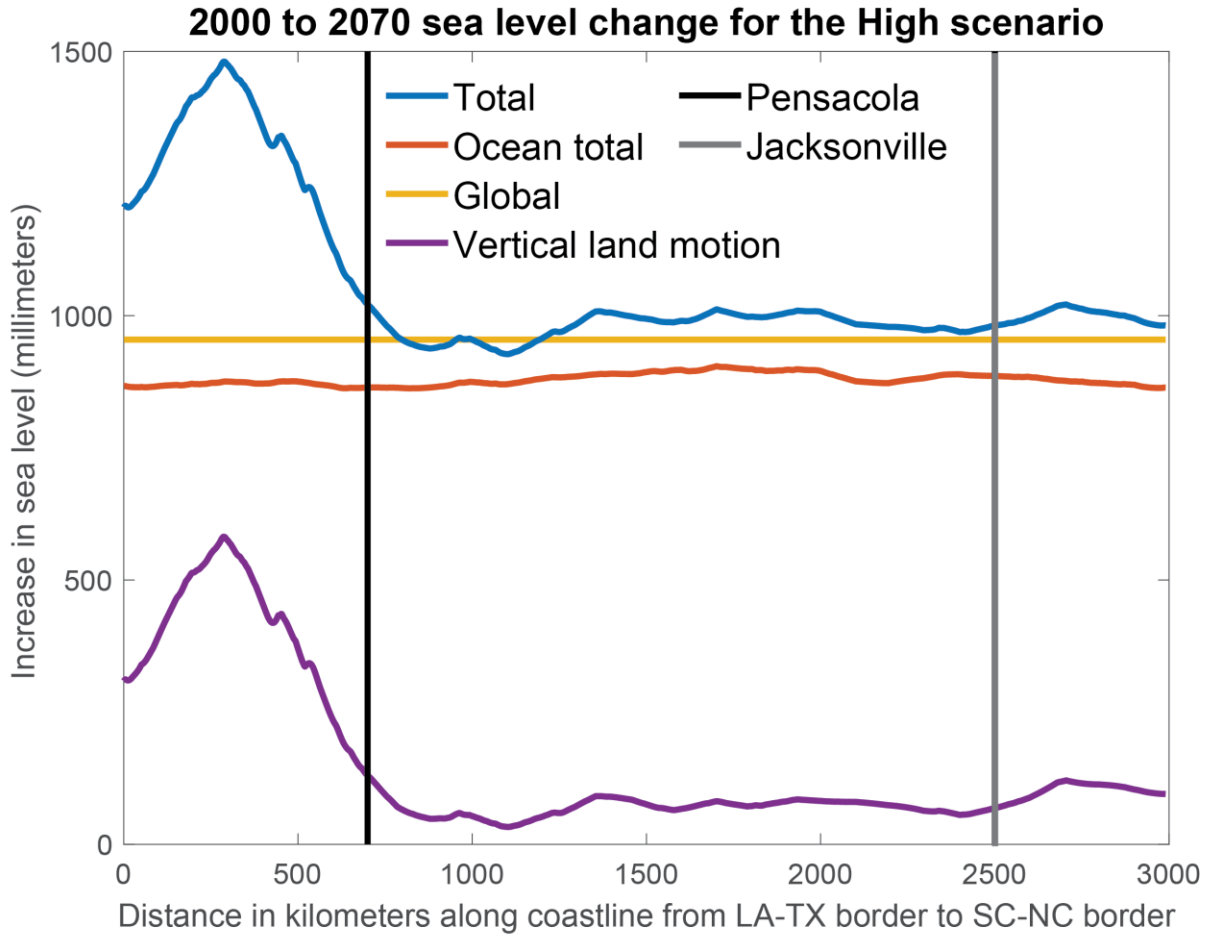
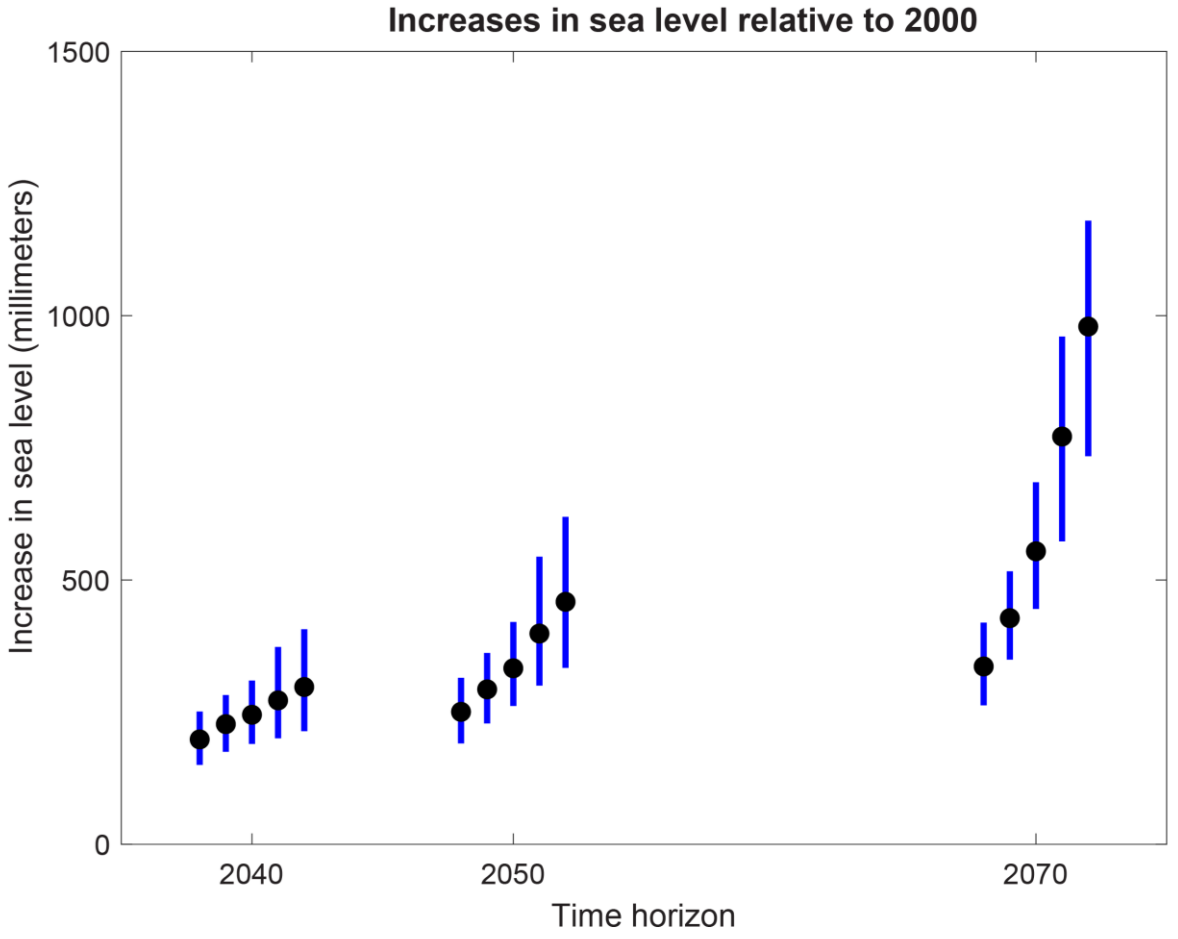
Changing sea level





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Changing sea level

Table 2: Exceedance probabilities for Florida projected to 2100 with emissions scenarios used in the Federal Task Force Report

Global mean sea level rise scenario (rise 2000–2100)	Predicted increase in global mean surface air temperature				
	1.5°C	2.0°C	**3.0°C**	4.0°C	5.0°C
Low (0.3 m)	92%	98%	>99%	>99%	>99%
Intermediate Low (0.5 m)	37%	50%	**82%**	97%	>99%
Intermediate (1.0 m)	<1%	2%	**5%**	10%	23%
Intermediate high (1.5 m)	<1%	<1%	<1%	1%	2%
High (2.0 m)	<1%	<1%	<1%	<1%	<1%

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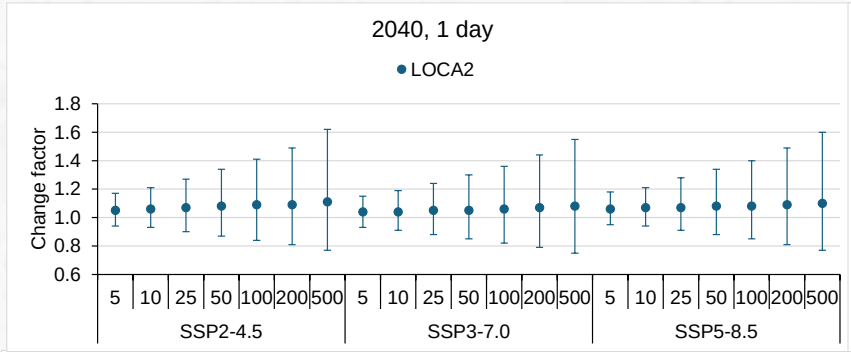
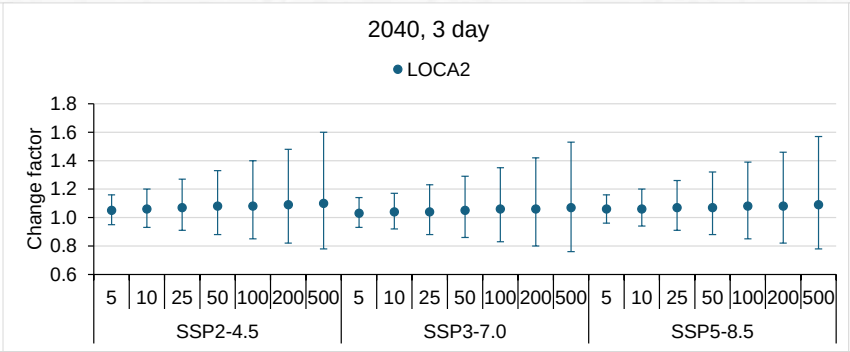
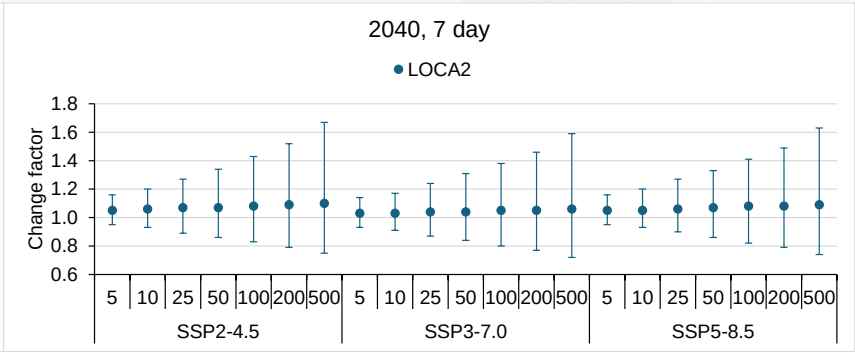
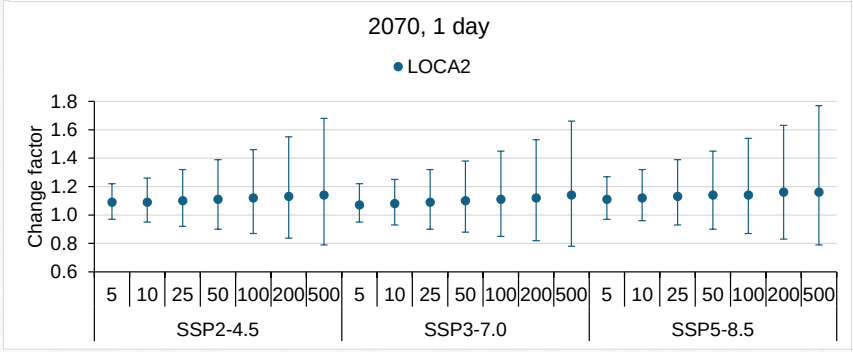
Changing precipitation

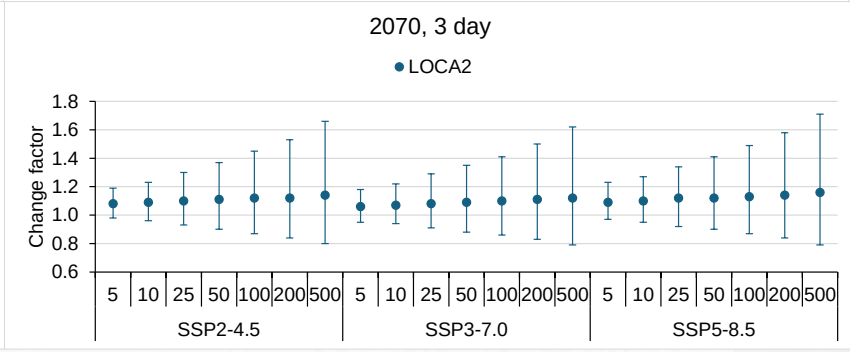
Median, 17th & 83rd percentiles

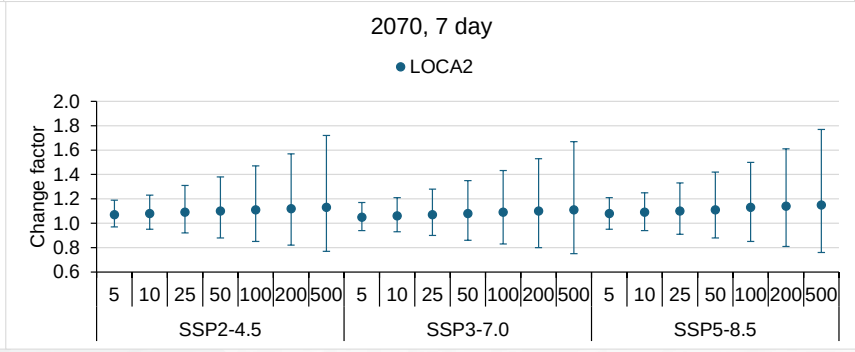












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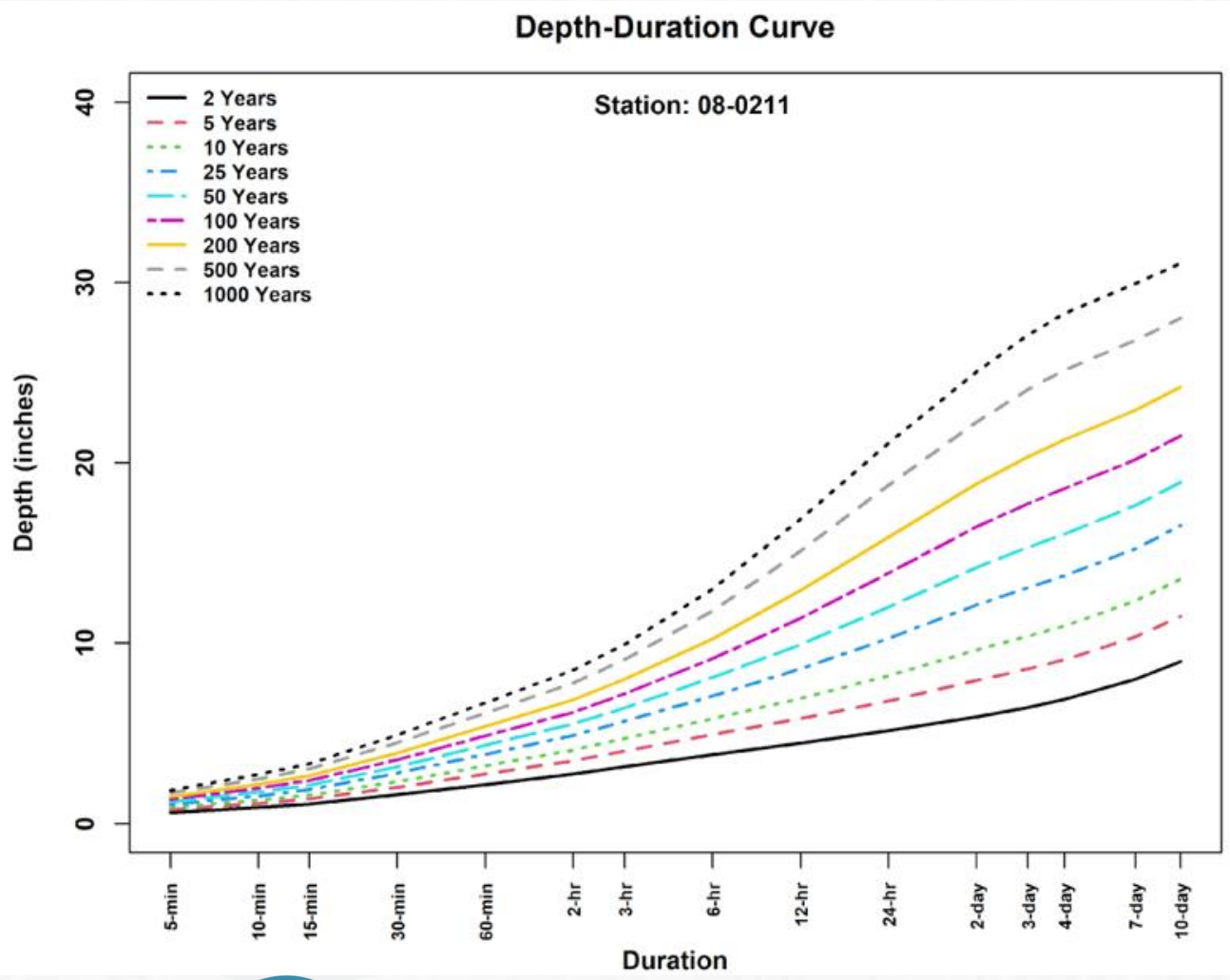
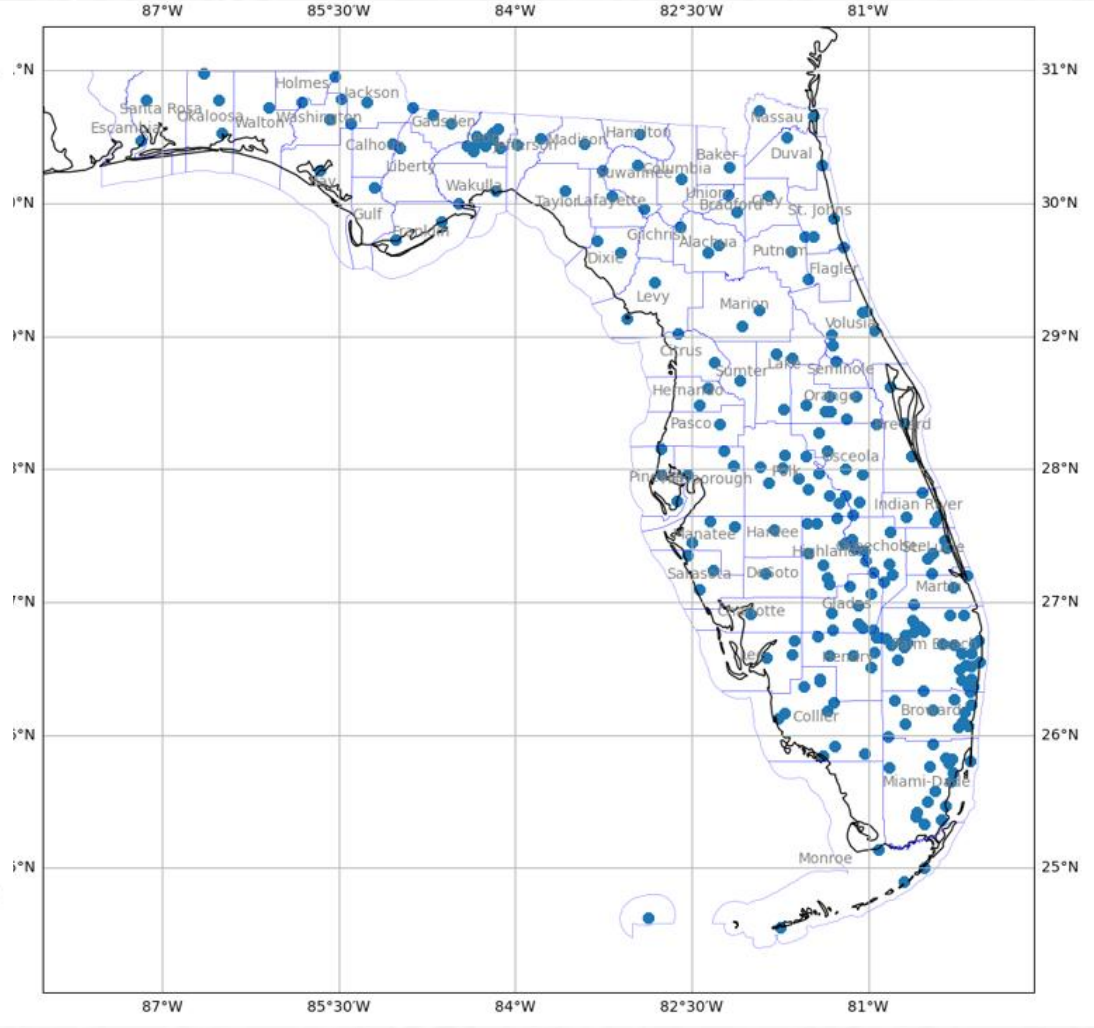
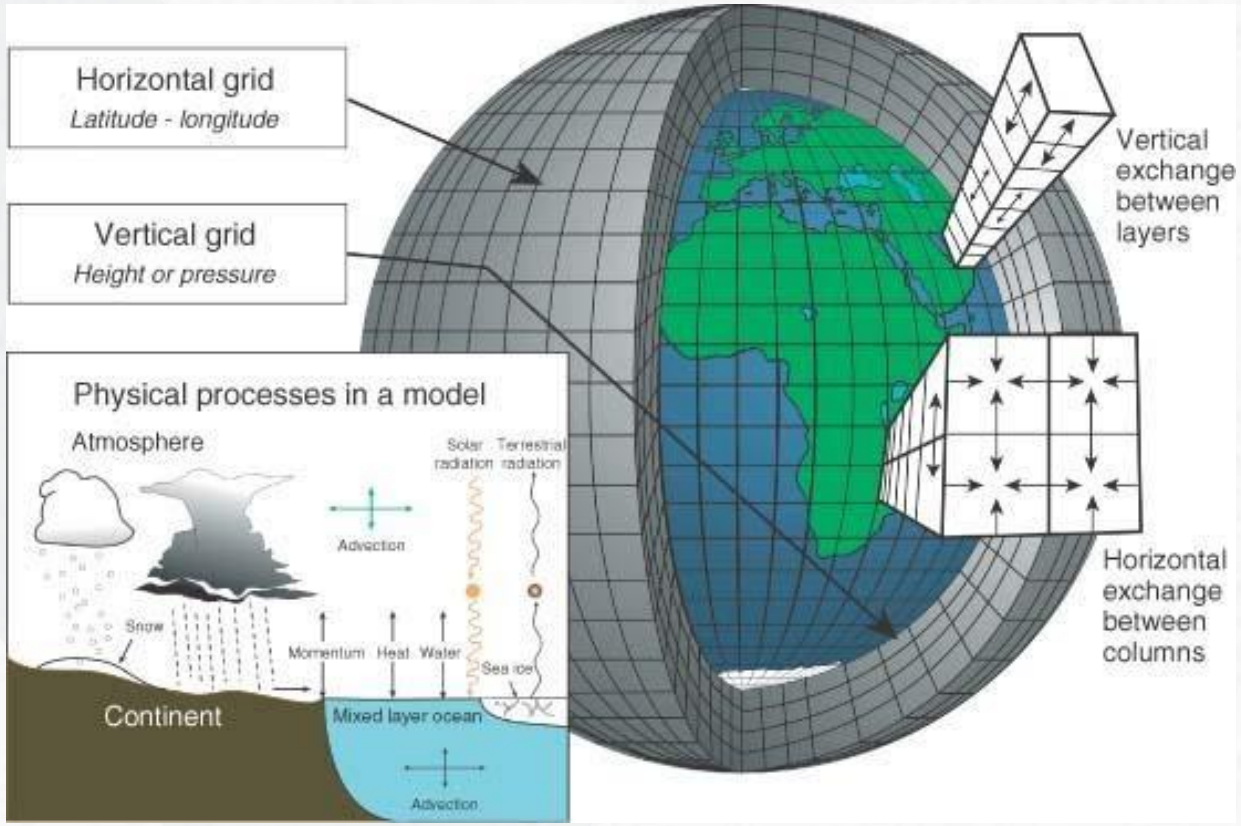
Changing precipitation



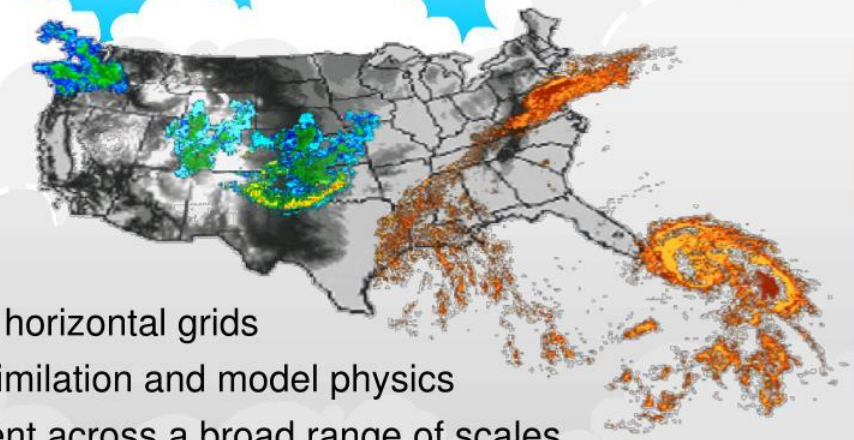


Higher resolution models



Weather Research and Forecast (WRF) Model

- Develop an advanced mesoscale forecast and assimilation system
- Promote closer ties between research and operations



Research:

Design for 1-10 km horizontal grids
Advanced data assimilation and model physics
Accurate and efficient across a broad range of scales
Well-suited for both research and operations
Community model support

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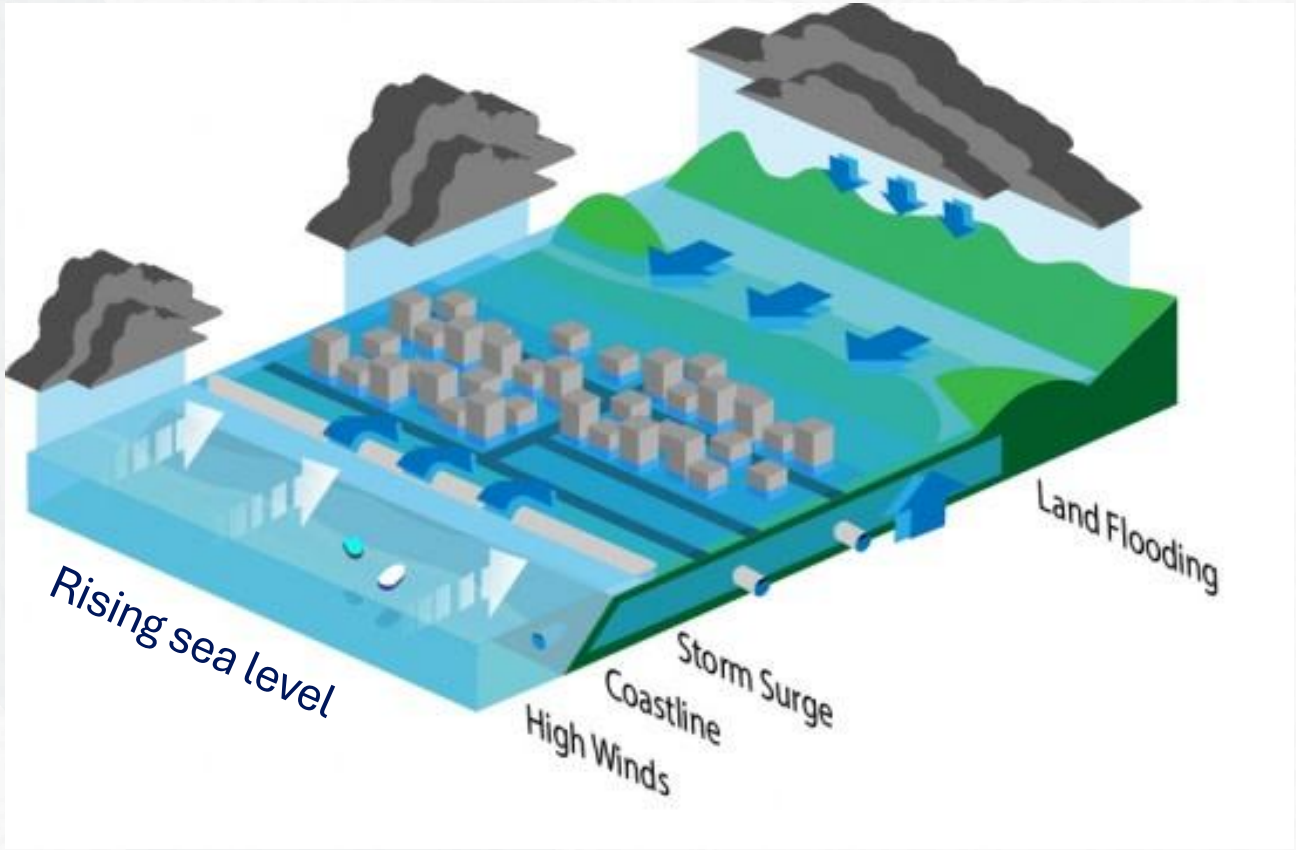
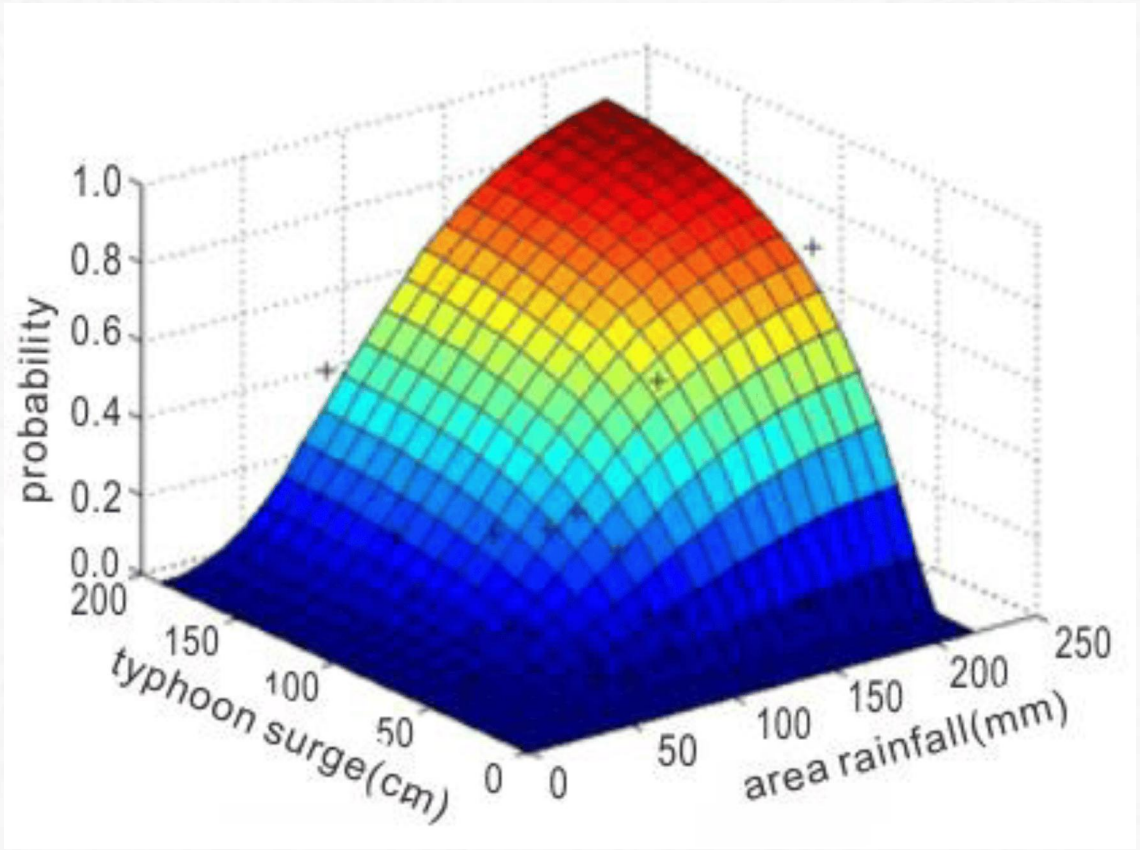
Compound flooding





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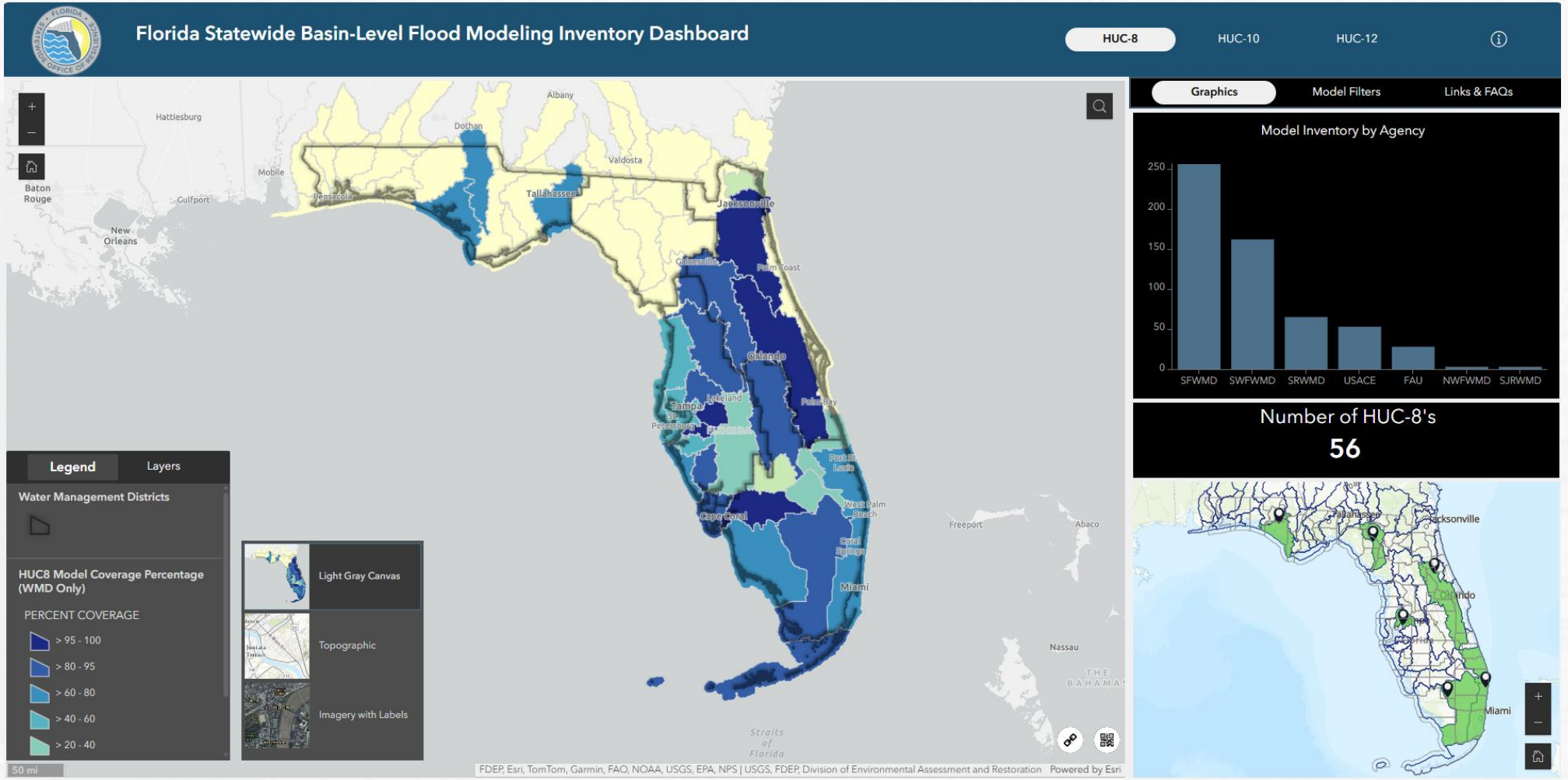
Inventory of models



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RESILIENT FLORIDA PROGRAM GRANTS PROGRAMS

Dataset → Assessment → Plan

protectingfloridatogether.gov

Files - Dropbox | Box | Login | Home - USF Staff Se... | Business & Finance... | SciENcv: Science Ex... | Home | Academic A... | SC ACIS2 (Weather... | National Ground-W...

PROTECTING TOGETHER

State Action | Resources | Grants | Search | Water Quality Status

$1.6B over 4 years

RESILIENT FLORIDA - PLANNING GRANTS

RESILIENT FLORIDA - IMPLEMENTATION GRANTS

IMPLEMENTATION GRANTS

PROJECT TYPE